Appendix F
Noise Calculations
List of Tables

Summary of Marine Terminal Operational Noise Impacts

Location	Distance, ft	Leq	24 Hour Peak CNEL	Current CNEL Annual Average	Proposed Project CNEL Annual Average
Bike path	100	64.0	70.6	69.7	71.2
Manhattan Beach	2,600	35.7	42.4	41.4	42.9
Dockweiler Beach	15,312	20.3	26.9	26.0	27.5
Chevron Gas Station	2,630	35.6	42.3	41.3	42.8
El Segundo Residence	1,584	40.0	46.7	45.7	47.2
Manhattan Beach Residence	2,640	35.5	42.2	41.3	42.7
Offshore Operations	7,920	47.7	54.7	50.7	52.2

Peak Noise Impacts on Area Receptors

Equipment	Number	Distance x, feet	Fraction of Time Generating Peak Noise During Day	Fraction of Time Generating Peak Noise During Evening	Fraction of Time Generating Peak Noise During Night	Sound Level at 50 feet (dBA)	Leq Day	Leq Evening	Leq Night	Total CNEL at 50 feet	Total CNEL at x feet	Leq at distance x, dBA
Bike Path	1	100	1.00	1.00	1.00	70	70	75	80	77	71	64
Manhattan Beach	1	2600	1.00	1.00	1.00	70	70	75	80	77	42	36
Dockweiler Beach	1	15312	1.00	1.00	1.00	70	70	75	80	77	27	20
Chevron Gas Station	1	2630	1.00	1.00	1.00	70	70	75	80	77	42	36
Closest City of El Segundo Residence	1	1584	1.00	1.00	1.00	70	70	75	80	77	47	40
Closest Manhattan Beach Residence	1	2640	1.00	1.00	1.00	70	70	75	80	77	42	36
Offshore	1	7,920	1.00	1.00	1.00	92	92	97	102	99	55	48

CNEL Specs *between 7 am and 7 pm add 0 dba, assumes 12 hours*
between 7 pm and 10 pm add 5 dba, assumes 3 hours
between 10 pm and 7 am add 10 dba, assumes 9 hours
MT equipment specified as 64 dbA at 100 feet in the 1996 EIR, which corresponds to 70 dBA at 50 feet
Offshore equipment specified as both berths (3 pumps, 2 tug engines and 1 horn per berth) for peak value

Annual Average Noise Impacts - Current Operations on Area Receptors
onshore equipment

Equipment	Number	Distance x, feet	Fraction of Time Generating Peak Noise During Day: Annual	Fraction of Time Generating Peak Noise During Evening: Annual	Fraction of Time Generating Peak Noise During Night: Annual	Sound Level at 50 feet (dBA)	Leq Day	Leq Evening	Leq Night	Annual CNEL at 50 feet	Annual CNEL at x feet	Leq at distance x, dBA
Bike Path	1	100	0.80	0.80	0.80	70	69	74	79	76	70	64
Manhattan Beach	1	2600	0.80	0.80	0.80	70	69	74	79	76	41	36
Dockweiler Beach	1	15312	0.80	0.80	0.80	70	69	74	79	76	26	20
Chevron Gas Station	1	2630	0.80	0.80	0.80	70	69	74	79	76	41	36
Closest City of El Segundo Residence	1	1584	0.80	0.80	0.80	70	69	74	79	76	46	40
Closest Manhattan Beach Residence	1	2640	0.80	0.80	0.80	70	69	74	79	76	41	36
Offshore	1	7,920	0.80	0.80	0.80	89	88	93	98	95	51	45

Annual Number of vessel visits 347
Hours per vessel visit 20.3 as per Chevron raw data on 2008 ship visits

Onshore equipment based on Chevron 1996 EIR Measurements
Offshore equipment annual average specified as single berths - 3 pumps, 2 tug engines and 1 horn per berth

Annual Average Noise Impacts - Proposed Project Operations on Area Receptors
onshore equipment

Equipment	Number	Distance x, feet	Fraction of Time Generating Peak Noise During Day: Annual	Fraction of Time Generating Peak Noise During Evening: Annual	Fraction of Time Generating Peak Noise During Night: Annual	Sound Level at 50 feet (dBA)	Leq Day	Leq Evening	Leq Night	Annual CNEL at 50 feet	Annual CNEL at x feet	*Leq at distance x, dBA*
Bike Path	1	100	1.13	1.13	1.13	70	71	76	81	77	71	64
Manhattan Beach	1	2600	1.13	1.13	1.13	70	71	76	81	77	43	36
Dockweiler Beach	1	15312	1.13	1.13	1.13	70	71	76	81	77	27	20
Chevron Gas Station	1	2630	1.13	1.13	1.13	70	71	76	81	77	43	36
Closest City of El Segundo Residence	1	1584	1.13	1.13	1.13	70	71	76	81	77	47	40
Closest Manhattan Beach Residence	1	2640	1.13	1.13	1.13	70	71	76	81	77	43	36
Offshore	1	7,920	1.13	1.13	1.13	89	90	95	100	96	52	45

Annual Number of vessel visits 487
Hours per vessel visit 20.3

Onshore equipment based on Chevron 1996 EIR Measurements
Offshore equipment annual average specified as single berths - 3 pumps, 2 tug engines and 1 horn per berth

Estimated Noise Levels due to Offshore MT Operations: Peak Day

peak day operations: pumping at both berths 24 hrs

Equipment	Number		Fraction of Time Generating Peak Noise During Day	Fraction of Time Generating Peak Noise During Evening	Fraction of Time Generating Peak Noise During Night	Sound Level at 50 feet (dBA)	Total Day Energy	Total Evening Energy	Total night Energy
Cargo Pumps	6		1.00	1.00	1.00	81	7.55E+08	7.55E+08	7.55E+08
Diesel Engines	4		0.17	0.00	0.22	90	6.67E+08	0.00E+00	8.89E+08
Horns/alarms	2		0.001	0.003	0.001	105	4.39E+07	1.76E+08	5.86E+07
Total Energy							1.47E+09	9.31E+08	1.70E+09
Total dBA without background							92	90	92
Total dBA with background and CNEL correction							92	95	102
Total Energy							1.5E+09	2.9E+09	1.7E+10
Total Energy Weighted by Hours							7.3E+08	3.7E+08	6.4E+09
Total CNEL at 50 feet							99		
Total CNEL at x feet							54.7		

Total CNEL at --> x *7920* *feet*

Leq at distance x, dBA *47.7*

CNEL Specs *between 7 am and 7 pm add 0 dba, assumes 12 hours*
between 7 pm and 10 pm add 5 dba, assumes 3 hours
between 10 pm and 7 am add 10 dba, assumes 9 hours

Assumes diesel tugs operating 2 hours during the daytime and 2 hours at nighttime
Cargo pumps based on highest value in EPA database of pumps, diesel engines based on highway truck at 35mph
Horns sound level estimated

Estimated Noise Levels due to Offshore MT Operations: Annual Average

Annual Average operations: single berth operating

Equipment	Number		Fraction of Time Generating Peak Noise During Day	Fraction of Time Generating Peak Noise During Evening	Fraction of Time Generating Peak Noise During Night	Sound Level at 50 feet (dBA)	Total Day Energy	Total Evening Energy	Total night Energy
Electric Pumps	3		1.00	1.00	1.00	81	3.78E+08	3.78E+08	3.78E+08
Diesel Engines	2		0.17	0.00	0.22	90	3.33E+08	0.00E+00	4.44E+08
Horns/alarms	1		0.001	0.003	0.001	105	2.20E+07	8.78E+07	2.93E+07
Total Energy							7.33E+08	4.66E+08	8.51E+08
Total dBA without background							89	87	89
Total dBA with background and CNEL correction							89	92	99
Total Energy							7.3E+08	1.5E+09	8.5E+09
Total Energy Weighted by Hours							3.7E+08	1.8E+08	3.2E+09
Total CNEL at 50 feet							96		
Total CNEL at x feet							51.7		

Total CNEL at --> x *7920* *feet*

Leq at distance x, dBA *44.7*

CNEL Specs *between 7 am and 7 pm add 0 dba, assumes 12 hours*
between 7 pm and 10 pm add 5 dba, assumes 3 hours
between 10 pm and 7 am add 10 dba, assumes 9 hours

Assumes diesel tugs operating 2 hours during the daytime and 2 hours at nighttime

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 04/28/2009
Case Description: El Segundo Pipeline Offshore Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Offshore	Residential	25.0	25.0	25.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Welder / Torch	No	40		74.0	7920.0	0.0
Welder / Torch	No	40		74.0	7920.0	0.0
Crane	No	16		80.6	7920.0	0.0
Crane	No	16		80.6	7920.0	0.0
truck, Highway > 35 mph - EPA	No	40		90.0	7920.0	0.0
truck, Highway > 35 mph - EPA	No	40		90.0	7920.0	0.0
truck, Highway > 35 mph - EPA	No	40		90.0	7920.0	0.0
truck, Highway > 35 mph - EPA	No	40		90.0	7920.0	0.0
truck, Highway > 35 mph - EPA	No	40		90.0	7920.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Welder / Torch	30.0	26.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
Welder / Torch	30.0	26.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
Crane	36.6	28.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
Crane	36.6	28.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
truck, Highway > 35 mph - EPA	46.0	42.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
truck, Highway > 35 mph - EPA	46.0	42.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
truck, Highway > 35 mph - EPA	46.0	42.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
truck, Highway > 35 mph - EPA	46.0	42.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
truck, Highway > 35 mph - EPA	46.0	42.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A
Total	46.0	49.1	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 04/28/2009
Case Description: El Segundo Pipeline Beach Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
El Segundo Beach Areas	Residential	25.0	25.0	25.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Welder / Torch	No	40		74.0	50.0	0.0
Welder / Torch	No	40		74.0	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Pickup Truck	No	40		75.0	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Welder / Torch	74.0	70.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Welder / Torch	74.0	70.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Crane	80.6	72.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	0.6	N/A						
Crane	80.6	72.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	0.6	N/A						
Dozer	81.7	77.7	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	1.7	N/A						
Pickup Truck	75.0	71.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Dump Truck	76.5	72.5	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Backhoe	77.6	73.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Backhoe	77.6	73.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	None	N/A						
Total	81.7	82.8	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A	None	N/A	1.7	N/A						

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
El Segundo Residential Areas	Residential	25.0	25.0	25.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Welder / Torch	No	40		74.0	1580.0	0.0
Welder / Torch	No	40		74.0	1580.0	0.0
Crane	No	16		80.6	1580.0	0.0
Crane	No	16		80.6	1580.0	0.0
Dozer	No	40		81.7	1580.0	0.0
Pickup Truck	No	40		75.0	1580.0	0.0
Dump Truck	No	40		76.5	1580.0	0.0
Backhoe	No	40		77.6	1580.0	0.0
Backhoe	No	40		77.6	1580.0	0.0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)	
			Day		Evening		Night		Day	
	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Welder / Torch	44.0	40.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Welder / Torch	44.0	40.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Crane	50.6	42.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Crane	50.6	42.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Dozer	51.7	47.7	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Pickup Truck	45.0	41.0	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Dump Truck	46.5	42.5	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Backhoe	47.6	43.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Backhoe	47.6	43.6	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A
Total	51.7	52.8	85.0	N/A	85.0	N/A	80.0	N/A	None	N/A

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Name: El Segundo Marine Terminal

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes:	City of El Segundo and Manhattan Beach
Community Noise Descriptor:	L_{dn}: CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition Roadway, Segment	Lanes	Median Width	ADT Volume	Design Speed (mph)	Alpha Factor	Vehicle Mix: Medium Trucks	Vehicle Mix: Heavy Trucks	CNEL at 100 Feet	Distance from Centerline of Roadway to Contour: 70 CNEL	65 CNEL	60 CNEL	55 CNEL
Analysis Condition												
Vista Del Mar/ Highland Ave south of Grand	4	0	26,960	45	0	3.2%	1.4%	68.3	67	212	670	2,117
Rosecrans Avenue east of Highland	4	0	17,460	45	0	3.2%	1.4%	66.4	-	137	434	1,371
Grand Avenue east of Vista Del Mar	2	0	6,950	45	0	3.2%	1.4%	62.3	-	54	170	538

[1] Distance is from the centerline of the roadway segment to the receptor location.

"-" = contour is located within the roadway right-of-way.